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# DIAGNOSTIC CRITERIA FOR GRADING THE SEVERITY OF ACUTE MOTION SICKNESS

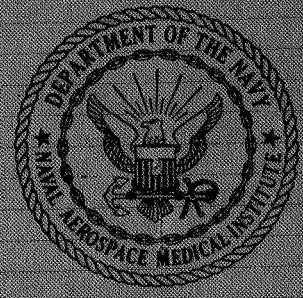
Ashton Graybiel, Charles D. Wood, Earl F. Miller II, and Dewey B. Cramer

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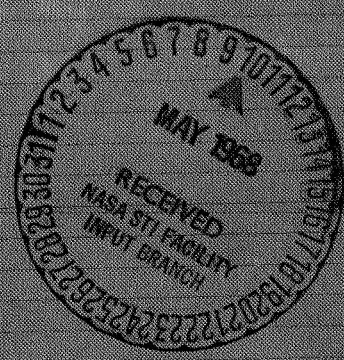


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DIAGNOSTIC CRITERIA FOR GRADING THE SEVERITY OF ACUTE  
MOTION SICKNESS\*

Ashton Graybiel, Charles D. Wood, Earl F. Miller II, and Dewey B. Cramer

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## SUMMARY PAGE

### THE PROBLEM

Although time has endorsed the usefulness of previously presented diagnostic criteria defining four levels of severity of motion sickness, it also has revealed certain limitations.

### FINDINGS

The new diagnostic criteria that have been developed differ from the old in two important respects: 1) "moderate malaise," previously defined on an exclusion basis, has been divided into two categories and precisely defined, and 2) numerical scoring is optional. These criteria are more suited to clinical application as empirical evaluations than for precise measurement of physiological functions. By holding fast to the definition of endpoints in the "old" criteria with proven reliability and validity, the change does not seriously affect the findings in experiments where the old criteria were used.

## INTRODUCTION

In earlier reports diagnostic criteria were presented (Table I) defining four levels of severity of motion sickness (2,3). This categorization was designed originally to evaluate susceptibility to acute motion sickness in a Slow Rotation Room (4), and its use was extended to studies involving other motion sickness producing devices in the laboratory and in evaluating air sickness and sea sickness (1,8). An important objective was to define an endpoint short of vomiting which was at once reliable and "acceptable" to the subject. The diagnostic level termed Malaise III (severe) met these requirements. Reliability and validity were demonstrated by the findings in connection with evaluating the effectiveness of antimotion sickness drugs (6,7); by using a double blind experimental technique not only was it possible to rank different drugs or combinations of drugs in terms of their effectiveness, but, in so doing, the drugs were also found to be grouped according to their principal pharmaceutical action.

Although time has endorsed the usefulness of the criteria shown in Table I, it also has revealed certain limitations. One shortcoming involved Malaise II (moderate) which was defined on an exclusion basis, i.e., symptoms more severe than Malaise I and less severe than Malaise III. This imprecision not only lessened discrimination from a diagnostic point of view but also rendered Malaise II relatively useless as an endpoint. A second limitation was the failure to define "other symptoms." A third limitation was the lack of numerical scoring which proved to be a handicap in data handling. For these and other reasons new diagnostic criteria were defined and put into practice.

## THE NEW CRITERIA

In making the changes the first step was to give arbitrary point scores to the four severity levels of symptoms used in the old criteria which were implied by their valuation; i.e., two symptoms in any of the three lower levels equaled one in the next higher level. The second step involved the identification of "other" symptoms and dividing them into two groups, one double the value of the other. This provided a list of "additional qualifying symptoms" (AQS) with a value of 1 point and "minimal" symptoms with a value of 2. In the third step Malaise II was divided into two levels of severity, M IIA and M IIB.

In brief, the new criteria differ (Table II) from the old mainly in establishing categories M IIA and M IIB and in numerical scoring. One of these, M IIA, has been tested and has been found to be reliable (5). To use it successfully, however, requires more cooperation from the subject and closer attention on the part of the experimenter or observer than is true for M III. It has the advantages of minimal discomfort, quick recovery, and reduced tendency to habituation as compared with endpoints having symptoms of greater severity.

Table I

Important Vestibular Symptoms\* Used in Diagnostic Categorization

Pathognomonic	Major	Minor	Diagnostic Terms
Vomiting	Retching		Vestibular Sickness:
	Nausea III or II	Nausea I	Vomiting or
	Inc. Saliv. III or II	Inc. Saliv. I	Two Major Sym. or
	Pallor III	Pallor II	One Major & Two Minor
	Cold Sweat III	Cold Sweat II	Malaise III:
	Drowsiness III	Drowsiness II	One Major or
			Two Minor or
			One Minor & Two Other
			Malaise I:
			Any Subj. Sym. or Any Sign
			Usually Assoc. with Subj.
			Sym.
			Malaise II:
			All Other

\*In rare instances other symptoms qualify.

Table II

Diagnostic Categorization of Different Levels of Severity of Acute Motion Sickness

Category	Pathognomonic 16 points	Major 8 points	Minor 4 points	Minimal 2 points	AQS* 1 point
Nausea syndrome	Vomiting or retching	Nausea <sup>+</sup> II, III	Nausea I	Epigastric discomfort	Epigastric awareness
Skin color		Pallor III	Pallor II	Pallor I	Flushing
Cold sweating		III	II	I	
Increased salivation		III	II	I	
Drowsiness		III	II	I	
Pain					Headache
Central nervous system					Dizziness: Eyes closed ≥ II Eyes open III

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Levels of Severity Identified by Total Points Scored				
Frank Sickness (S)	Severe Malaise (M III)	Moderate Malaise A (M IIA)	Moderate Malaise B (M IIB)	Slight Malaise (M I)
≥ 16 points	8 - 15 points	5 - 7 points	3 - 4 points	1 - 2 points

\*AQS = Additional qualifying symptoms. <sup>+</sup>III = severe or marked, II = moderate, I = slight.

The use of point scoring increases discrimination by providing "ranges," especially in the case of severe malaise and frank sickness as well as facilitating data handling.

Great reliance has been placed, as heretofore, on the five cardinal symptoms of motion sickness, and not more than one score for any symptom, e.g., nausea syndrome, may be used in any evaluation. The symptomatology of the "nausea syndrome" has been extended to include epigastric discomfort and epigastric awareness. The former is defined as a feeling of distress which is more than "awareness" but short of nausea which implies a feeling of being ill; epigastric awareness is defined as a feeling which draws attention to the epigastric area but is not uncomfortable. Although motion sickness involves more symptoms than are included under the nausea syndrome, they are rarely as prominent or distressing. Unless a susceptible person is exposed to fairly severe stress, the evolutionary development of the nausea syndrome may go through the steps indicated in Table II, but as everyone with experience knows, there are exceptions.

Only two symptoms have been added to the big five, dizziness and headache. Dizziness is broadly defined to include giddiness and, in common parlance, vertigo; the role of vision is taken into account by requiring that "severe dizziness" be apparent with eyes open to qualify. Headache is a more frequent symptom in subacute or chronic motion sickness but may appear early.

As much attention was given to rejection as to inclusion of symptoms. Symptoms not included fell into three categories: 1) those reliable but difficult to measure or estimate, e.g., respiratory irregularity; 2) those reliable but having a similar diagnostic significance to a symptom already present, e.g., anorexia; and 3) those with lack of reliability, e.g., blurred vision.

The criteria put forward in this report fit many situations in which symptoms of motion sickness appear in a short period of time. Modifications in scoring may be required to increase accuracy in situations where the force environment cannot be manipulated and the stress is either very mild or very severe. Mild stress over long periods tends to evoke symptoms characteristic of subacute or chronic motion sickness, e.g., general discomfort, fatigue, headache, anorexia, etc. Severe stress may result in overshooting the endpoint because of the lag between stimulus and response. A small percentage of persons do not manifest the usual clinical picture of acute motion sickness, and in these instances the proposed diagnostic criteria may prove to be inadequate. The experienced investigator will improvise and should have little difficulty. Symptoms of anxiety and fear may be indistinguishable from symptoms of motion sickness; both the individual and the circumstances need to be taken into account. Persons who minimize or exaggerate their subjective symptoms may provoke errors in estimations; this should be suspected when there is lack of concordance between objective signs and subjective complaints. Serial determinations are usually needed to establish a baseline; in doing this habituation must be taken into account. The criteria are of limited usefulness in chronic motion sickness.

## REFERENCES

1. Deane, F. R., Wood, C. D., and Graybiel, A., The effect of drugs in altering susceptibility to motion sickness in aerobatics and the Slow Rotation Room. Aerospace Med., 38:842-845, 1967.
2. Graybiel, A., Vestibular sickness and some of its implications for space flight. In: Fields, W. S., and Alford, B. R. (Eds.), Neurological Aspects of Auditory and Vestibular Disorders. Springfield, Ill.: Charles C Thomas, 1964.
3. Graybiel, A., The labyrinth and space flight. In: Bedwell, T. C., Jr., and Strughold, H. (Eds.), Bioastronautics and the Exploration of Space. Brooks Air Force Base, Texas: Aerospace Medical Division, Air Force Systems Command, 1966.
4. Graybiel, A., Clark, B., and Zarriello, J. J., Observations on human subjects living in a "Slow Rotation Room" for periods of two days. Arch. Neurol., 3: 55-73, 1960.
5. Miller, E. F. II, and Graybiel, A., Unpublished data.
6. Wood, C. D., Graybiel, A., and McDonough, R. C., Human centrifuge studies on the relative effectiveness of some antimotion sickness drugs. Aerospace Med., 37:187-190, 1966.
7. Wood, C. D., Graybiel, A., and Kennedy, R. S., A comparison of effectiveness of some antimotion sickness drugs using recommended and larger than recommended doses as tested in the Slow Rotation Room. Aerospace Med., 37:259-262, 1966.
8. Wood, C. D., Graybiel, A., Cramer, D. B., and Molina, E. A., Comparison of antimotion sickness drug evaluations at sea and on the Slow Rotation Room. NAMI-1013. NASA R-93. Pensacola, Fla.: Naval Aerospace Medical Institute, 1967.



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